

Acids and Bases

Summary :-

1. Acids are the chemical compounds that taste sour and turn blue litmus red. They are acidic in nature. Apple, lemon, orange, tomato, etc. are some examples of natural acids whereas curd, soft drinks, vinegar, etc. are some examples of man-made substances containing acids.

2. Acids are classified on the basis of their strength, origin and concentration as strong and weak acids, organic and inorganic acids, dilute and concentrated acids respectively. Sulphuric acid, nitric acid and hydrochloric acid are the commonly known acids that are used in various fields.

3. Bases are bitter in taste, soapy to touch and turn red litmus blue. They are basic in nature. Sodium hydroxide, potassium hydroxide, calcium hydroxide are some of the common examples of bases which are used in various fields. Soaps, detergents, baking powder, toothpaste are some bases that we use in our daily life.

4. Neutral substances are those which are neither acidic nor basic. Pure water and sodium chloride solution are neutral substances. Indicators are the substances which are used to identify whether a substance is acid or base. The solutions of these substances show different colour in acidic, basic and neutral medium. They are natural as well as synthetic. Litmus, turmeric and extract of China rose petals are the natural indicators whereas phenolphthalein and methyl orange are some synthetic indicators. Salt is a compound formed by the reaction of an acid with a base. Salts are broadly classified into acidic salts, basic salts and normal salts.

5. The reaction between an acid and a base is known as neutralisation. In neutralisation reaction, salt and water are produced with the evolution of heat. Neutralisation process holds great importance in everyday life like indigestion, treatment of ant bite, soil and factory waste treatment etc.

Main Points

Acids

- Acids are substances that taste sour and are corrosive in nature.
- It turns blue litmus paper to red.
- These substances are chemically acidic in nature. E.g.: -orange juice, curd, vinegar, hydrochloric acid etc.

Bases

- Bases are substances that, in aqueous solution, are slippery to the touch and bitter in taste.
- It turns red litmus paper to blue.
- These substances are chemically basic in nature. Eg:- soap, ammonium hydroxide, calcium hydroxide, etc

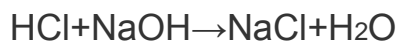
Neutralisation Reaction

- When an acid and base react with each other to form a salt, water and heat then such reaction is known as neutralisation reaction.
- In this reaction, the acidic and basic nature of the acid and base respectively are destroyed.
- The reaction between hydrochloric acid and sodium hydroxide is a classic neutralisation reaction where sodium chloride is formed.
$$\text{HCl} + \text{NaOH} \rightarrow \text{NaCl}(\text{salt}) + \text{H}_2\text{O}$$

Salts

Salts

- Salt is the product formed from the neutralisation reaction of acids and bases.
- In the reaction between hydrochloric acid and sodium hydroxide the salt formed is sodium chloride.



- Salt can be acidic, basic or neutral in nature.

Visual Indicators

Indicators

Substances which are used to test whether a substance is acidic or basic are called indicators.

	Acidic Solution	Basic Solution
Red litmus	No change	Turns blue
Blue litmus	Turns red	No change

Natural Indicators

- Plants or plant parts contain useful chemicals that are used for testing an acidic or basic property of a solution are termed as natural indicators. China Rose and turmeric are examples of natural indicators.

Litmus

- Litmus is a naturally occurring purple indicator which is extracted from lichens.
- When added to an acidic solution, it turns red and when added to a basic solution, it turns blue.
- It is available in the form of a solution or as strips of paper known as litmus paper.

(A) Red litmus turns blue indicating a basic solution

(B) Blue litmus turns red indicating an acidic solution

Phenolphthalein

- Phenolphthalein is an acid-base indicator which is colourless in acid solution but turns pink to red as the solution becomes alkaline.
- It is a synthetic indicator and is used for the neutralisation experiment.

Olfactory Indicators

- Olfactory indicators are substances whose smell changes whether they are mixed with an acidic or a basic solution.
- Onion, clove oil and vanilla extract are examples of such indicators.

Visual Indicators

- Visual Indicators are substances used to show visually (as by a change in colour) the condition of a solution with respect to the presence of a particular material (as a free acid or base).
- Common examples are litmus, red cabbage, phenolphthalein, etc

Neutralization

Neutralisation in Daily Life

- During indigestion, taking milk of magnesia (magnesium hydroxide) gives us relief as it neutralizes the effect of excess acid produced inside the stomach.
- The effect of ant sting which is caused by formic acid can be neutralized by rubbing moist baking soda (basic in nature).
- To ensure that plants can grow well, the soil is treated with either acids or bases depending if it's basic or acidic in nature.
- Factory wastes, generally being acidic in nature can cause environmental damage, are treated with basic substances before discharge.

Safety Measures While Using Acids

- When diluting acids, pour the acid into the water, NOT water into acid as this may cause spattering of the acid.
- Safety gloves are to be worn whenever working with acids or bases.

Uses of Acids and Bases

- Food preservation – Citric acid.
- Aerated drinks – Carbonic acid.
- Baking powder – Tartaric acid.
- Cooking – Acetic acid(vinegar)
- Manufacture of soaps – Sodium hydroxide.
- Manufacture of bleaching powder – Calcium hydroxide
- As a foaming agent in fire extinguishers – Aluminium hydroxide.

Treasures- Acid rain is the rain containing excess of acids. The rain becomes acidic due to the presence of carbon dioxides, sulphur dioxide and nitrogen dioxide in air. These gases dissolve in raindrops to form carbonic acid, sulphuric acid and nitric acid. Acid rain can cause damage to historical monuments, buildings, plants and animals
